Multi-Surface Light Table

Dr. Peggy Li, JPL

Herb Siegel, JPL
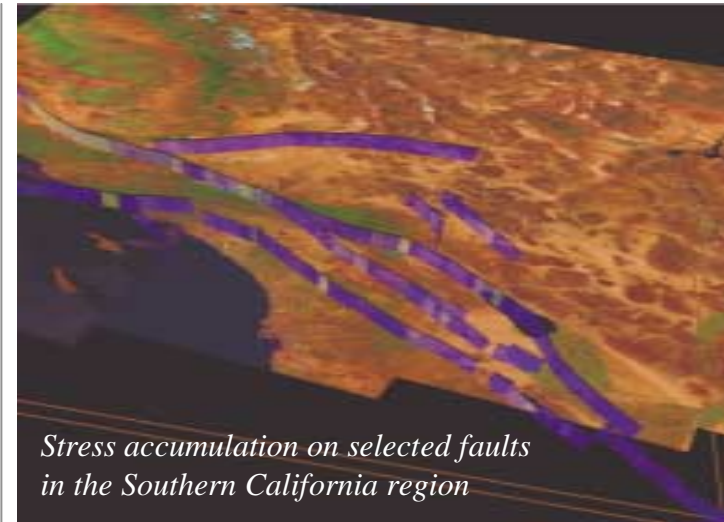
Multi-Surface Light Table

PI: Dr Peggy Li, JPL

Objective

- Build a Multi Surface Light Table (MSLT) based on the design of Digital Light Table to display fault surfaces (as polygons) together with surface image and digital terrain.
- View the fault database as catalog data as well as fault polygons overlaid on the image and terrain. Link the catalog data and the fault overlay by mouse click and drag.
- Represent and animate the time based feature changes on those surfaces.

Stress accumulation on selected faults in the Southern California region

MSLT Control Panel

Approach

- Use hierarchical multi-resolution data representation for fast panning and zooming of large image /Digital Elevation Map datasets
- Use OpenGL and X Windows, portable to Linux and all Unix platforms

CoIs: H.Siegel/JPL
Partners: A.Donellan/JPL, M.Pierce/Indiana U, J.Rundle/UC Davis, L.Grant/UC-Irvine

Key Milestones

- Display fault database both as a text catalog and polygonal objects overlaid with the terrain/image. 9/02
- Derive special viewing methods for multiple surface objects. 2/03
- Support time-varying data visualization on fault surfaces using Virtual California datasets 9/03
- Deliver MSLT source code and documentation via OpenChannel 2/04
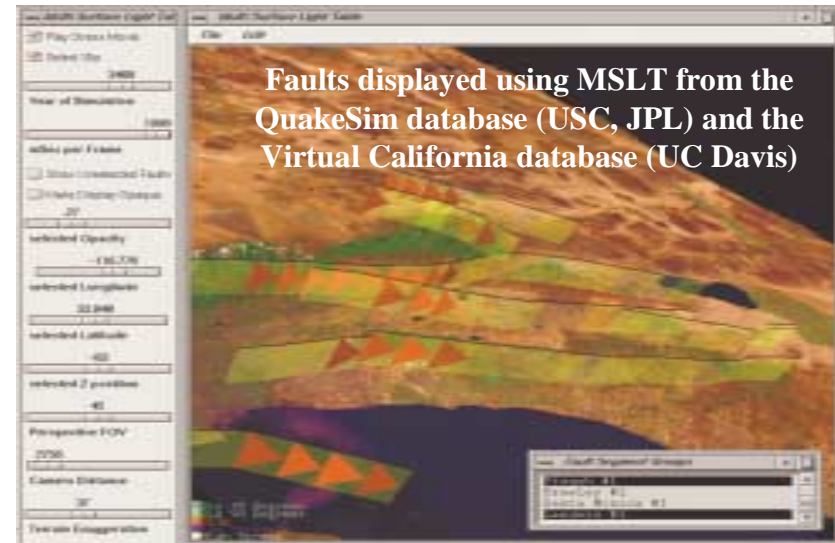- Integrate MSLT with the QuakeSIM portal 9/04

$TRL_{in} = 3$

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Faults displayed using MSLT from the QuakeSim database (USC, JPL) and the Virtual California database (UC Davis)

Accomplishments

Developed a tool that enables Earth scientists to view earth quake faults in three dimensions together with very high resolution terrain on their workstations.

- Runs on Linux, Unix, and Mac OS X workstations
- Allows pans, zooms, and tilts using the mouse to control the visualization
- Pages the terrain data from disk automatically

Publicly released via OpenChannel, an open source repository

MSLT also visualizes the replay of John Rundle's Virtual California (VC) simulation from UC Davis. VC simulations evolve stress and slips on multiple segments of earthquake faults. The color of a fault segment represents the stress and red arrows on a fault segment represents a slip. MSLT permits interactive viewing control during simulation replay. The frame depicted above reveals earthquake coupling among faults.

Co/Is: P.Li/JPL
Partners: A.Donnellan/JPL, J.Rundle/UC Davis

$TRL_{in} = 3; \quad TRL_{out} = 6$

Open Channel Foundation publishes software from academic & research institutions

url:
http://www.openchannelsoftware.org

MSLT (Multi-Surface Light Table) is a tool for viewing earth quake faults with high resolution terrain and to visualize the replay of simulations of stress and slips

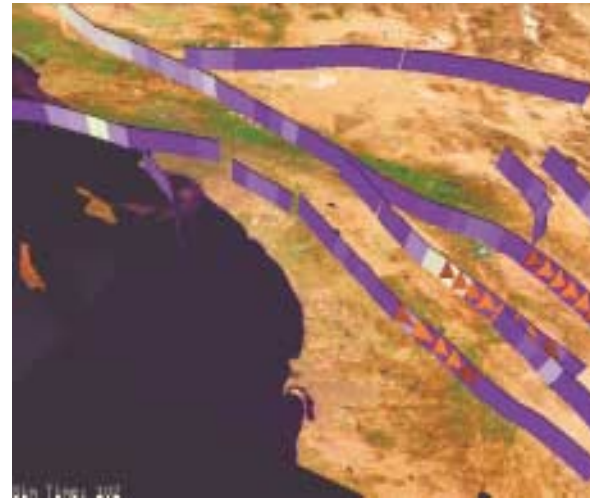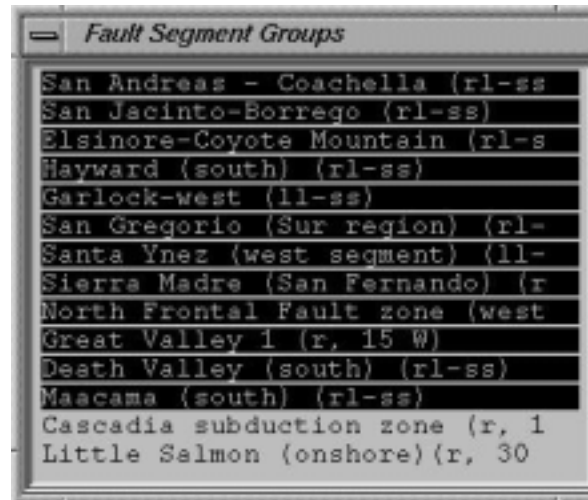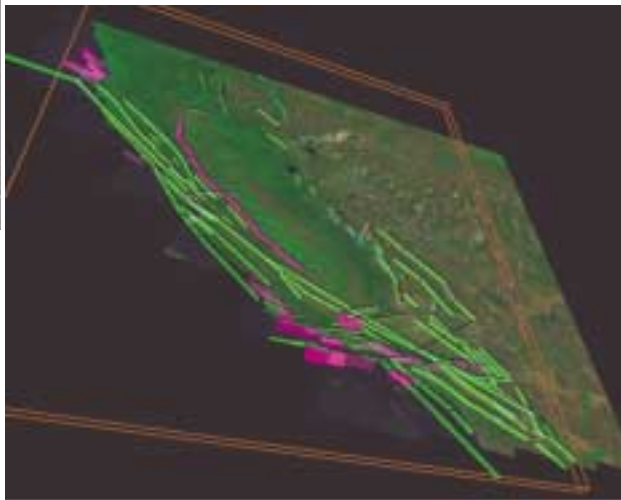MSLT has been publicly available since March 7, 2005
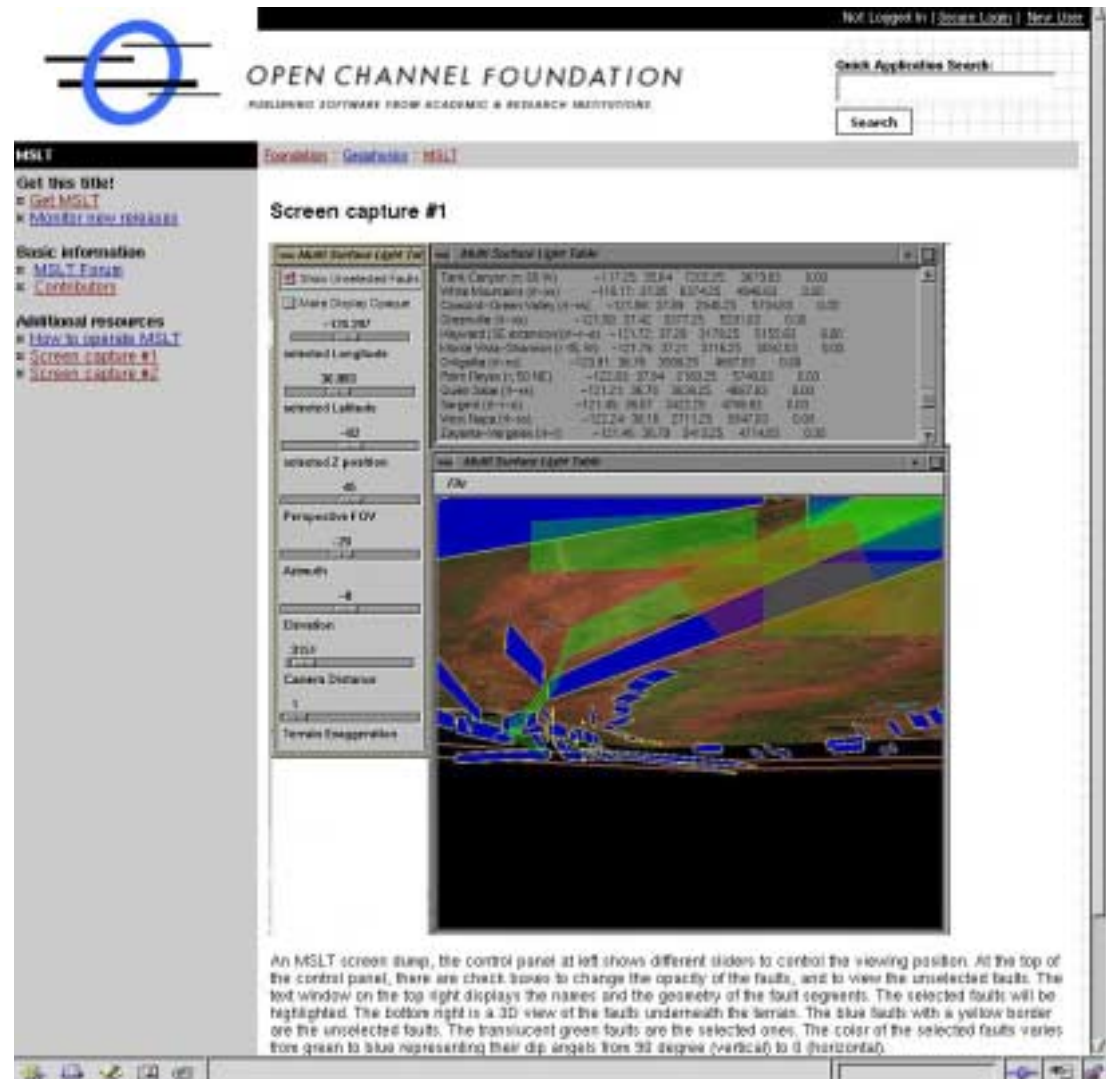
MSLT Example Screens

Standard MSLT Control Panel
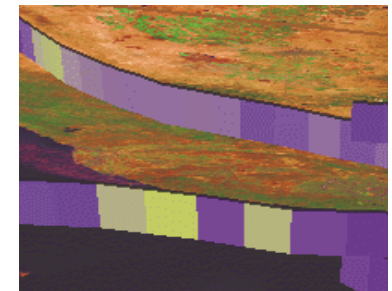

Faults in terrain with color coded dip angle

Simulation reveals cross triggering in parallel faults

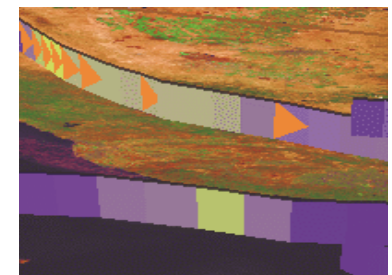**Simulation Control Panel Extension**

Fault is Yellow during high stress and Blue after stress release

Faulting flashes Red arrrows

Fault selection list box. Selections can be made with list box or picking.

Fault Segment Groups:
- San Andreas – Coachella (rl-ss)
- San Jacinto-Borrego (rl-ss)
- Elsinore-Coyote Mountain (rl-s
- Hayward (south) (rl-ss)
- Garlock-west (ll-ss)
- San Gregorio (Sur region) (rl-
- Santa Ynez (west segment) (ll-
- Sierra Madre (San Fernando) (r
- North Frontal Fault zone (west
- Great Valley 1 (r, 15 W)
- Death Valley (south) (rl-ss)
- Maacama (south) (rl-ss)
- Cascadia subduction zone (r, 1
- Little Salmon (onshore)(r, 30